California Global Warming Solutions Act of 2006

Workgroup on Reporting General Stationary Combustion GHG Emissions

Implementation of AB 32 Requirements

California Air Resources Board

June 25, 2007 - Cal/EPA Headquarters

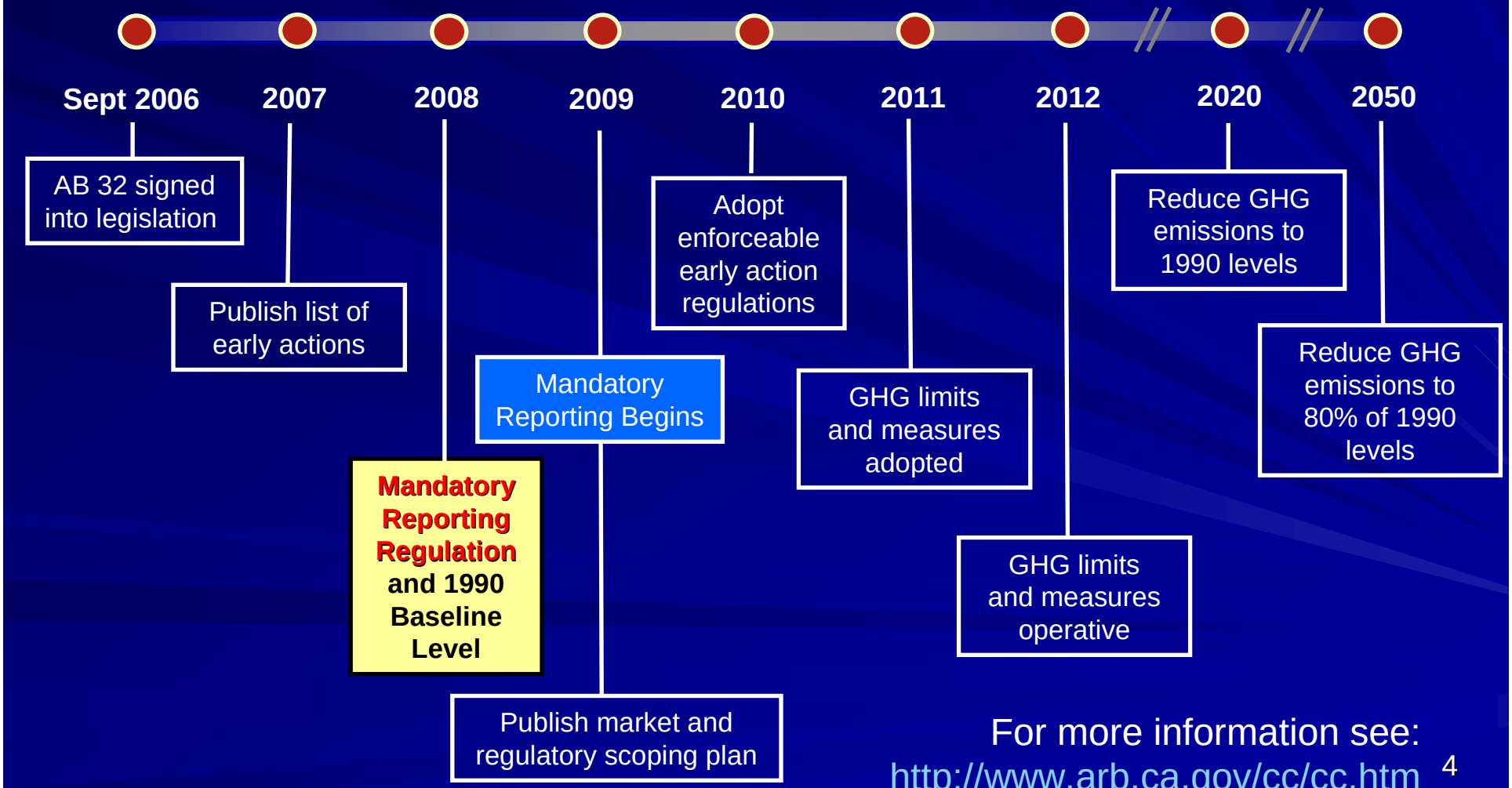
Why We Are Here Today

- Discuss proposals for GHG emission estimation, reporting and verification
- Focus on general stationary source fuel combustion
  - Includes facilities emitting ≥ 25,000 metric tons of CO2 from stationary combustion
  - May include cogeneration facilities

Agenda

- Overview of Mandatory Reporting Regulation
- General Reporting Requirements
- Proposed Reporting Requirements for Stationary Combustion Sources
- Cogeneration Proposal
- Verification of Reported Emissions

California Global Warming Solutions Act of 2006 (AB 32)



For more information see:
http://www.arb.ca.gov/cc/cc.htm

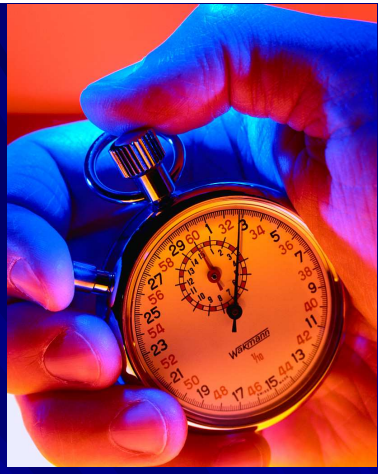
AB 32 Statutory Requirements for Reporting

- Regulation for reporting and verification due by January 1, 2008
- Begin with sources contributing the most to statewide emissions
- Account for all electricity consumed, including imports
- Provide reporting tools

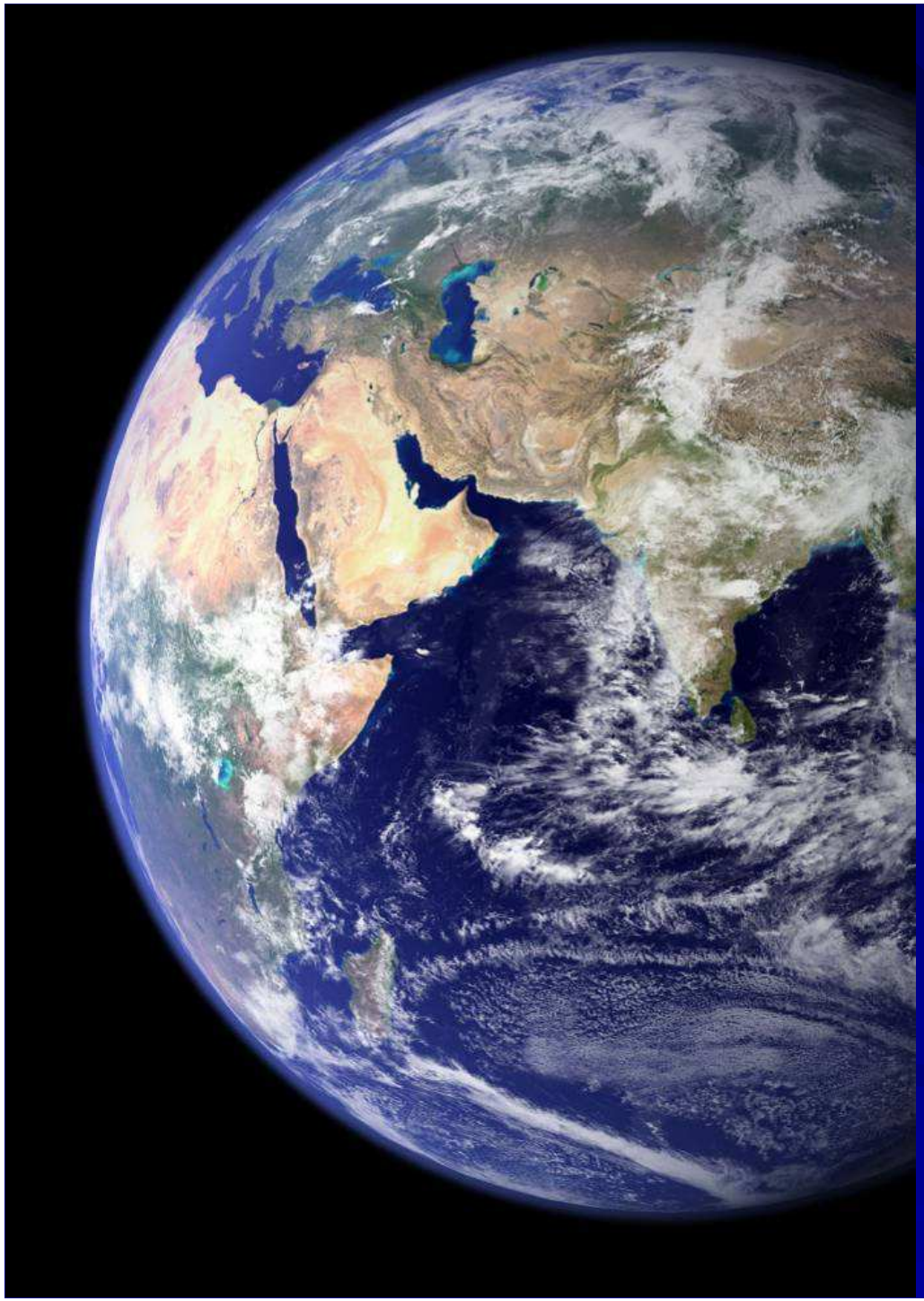
Timing for Reporting to Begin

- ARB staff proposal for reporting and verification: October 2007
- Board consideration of staff proposal: December 2007
- Reporting would begin in 2009 – for 2008 emissions

Proposed Reporting and Verification Cycle



- Power Plants & Co-generators selling energy to other users
  - Emissions reports due by April 1
  - Verification complete by July 31
- Utilities, Refineries, Cement Plants and other stationary combustion sources
  - Emissions reports due by September 1
  - Verification complete by December 31



Mandatory Reporting:

General Concepts

Goals of Reporting

- Improve GHG inventory
- Track trends
- Support emission reduction strategies
- Consistency with other programs

Reporting: General Requirements

- Annual reporting at the facility level
- Responsible party with facility "operational control" must report
- Report emissions for specified facility sources and gases
- Report purchased energy use (?)

Initial Reporting Facilities

- Power plants (390) & utilities (50)
- Oil refineries (25)
- Cement plants (11)
- Cogeneration
- Large stationary combustion sources (140)

94% of point source CO_2 emissions




Defining a Facility

- Property, plant, structure, installation, equipment, sources on one or more contiguous or adjacent properties
- Under common ownership or control
- Emits GHGs
- Considered a single major industrial source grouping (need feedback)

Reporting: Facility-wide Basis

- Emissions will be reported on a facility-wide basis
  - Regulation will specify detail required
- Supporting data to be available to ARB
- Verifiers will review supporting data
  - More on verification later

Potential Facility Emission Sources

- Stationary combustion
- Manufacturing processes
- Fugitive emissions
- Mobile combustion
- Energy purchases

What to Report

- All facilities subject to reporting provide:
  - CO2, CH4, N2O emissions from stationary combustion of fossil fuels
  - CO2, CH4, N2O emissions from stationary combustion of biofuels
  - Energy purchases and providers (electricity, steam, heat, cooling) -- ?
- Other “sector” facilities report additional GHG emissions as specified in regulation
  - Process emissions
  - Specified fugitive emissions

Emission Calculation Methodologies

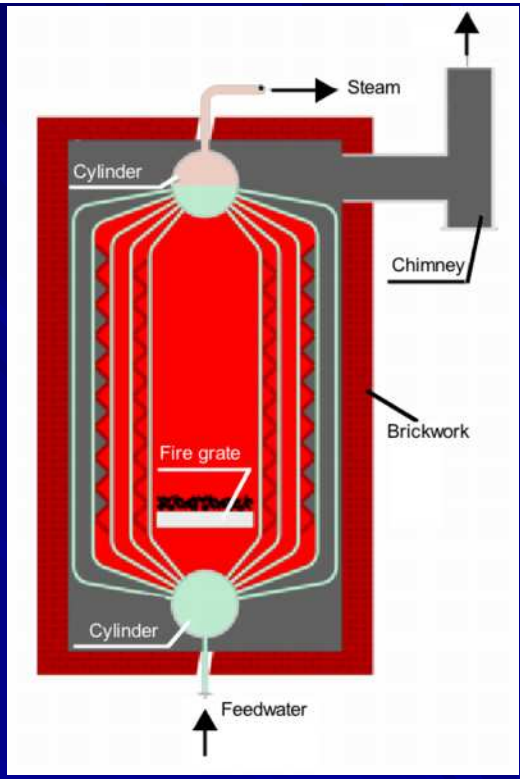
- Key calculation requirements will be regulatory
  - Activity data requirements
  - Emission calculation methods and inputs
  - Sources required to be estimated
- Emission factors and supporting information in technical guidance

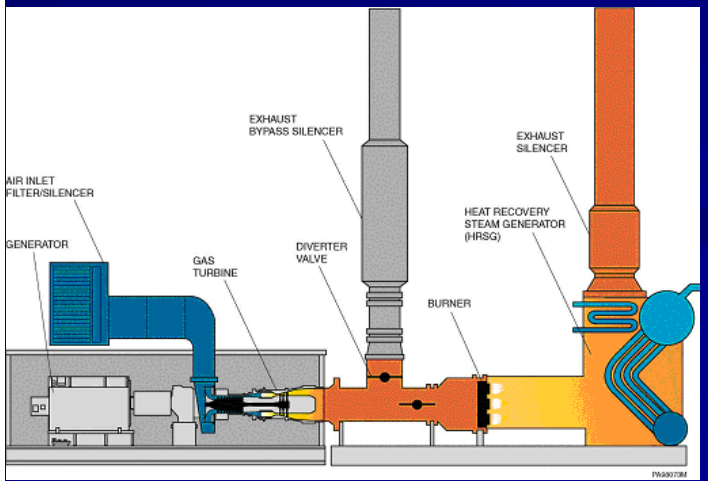
Mandatory Reporting:

Technical Details

Large Stationary Combustion Sources

- Defining large stationary combustion sources





Defining a "Large" Stationary Combustion Source

- Proposed facility threshold:

  25,000 metric tons CO2 per year

- ~140 facilities would report
- Estimate based on 2004 air district permit data
  - Fuel use to estimate CO2
- Threshold consistent with EU reporting

Why 25,000 Tons CO2?

- Performed comprehensive analysis of air district combustion data
- "Sector" facilities about 73% stationary combustion CO2
- At 25,000 threshold, bring in 21% additional combustion CO2 emissions and ~140 facilities
- Lower thresholds (e.g., 10,000 tons) only brings in ~2% more CO2 while doubling number of reporting facilities

Meeting the Threshold

- Emissions based on single facility emissions only
  - Each facility counted separately even if multiple facilities under common ownership
- Threshold determination based only on CO2 emissions from stationary combustion
  - Does not include purchased electricity, steam, heating, cooling
  - Does not include mobile, fugitive, or others

How Will You Know to Report?

- ARB will work to ensure all ≥ 25,000 ton facilities know of requirements
- Fuel usage can be used to quickly approximate CO2 emissions

Producing 25,000 Metric Tons of CO_2

Approximately equivalent to:

- ~ 3,000,000 gallons gasoline burned
- ~ 2,500,000 gallons diesel burned
- ~ 500,000 MMBtu natural gas burned
- ~ 270,000 MMBtu coal burned

Major Sectors Affected
(only if ≥ 25,000 tons CO2 from combustion)

- Natural gas transmission
- Industrial gases
- Paperboard manufacture
- Colleges and universities
- Oil production
- Food processing
- Steel foundries
- Mineral processes
- Glass container
- Malt beverages

Calculating Stationary Combustion Emissions

- Non-mobile sources:
  - Turbines, boilers, internal combustion engines, flares, etc.
- Methodology:
  - Fuel use calculation

> *Total annual emissions = emission factor * amount of annually consumed fuel*

  - ARB will provide emission factors for various fuels

Stationary Source Combustion Reporting – Fuel Types

- Natural gas
- Distillate or residual oil
- Coal (anthracite, bituminous, sub-bit., lignite)
- Biomass (wood, food waste, etc.)
- Biogas
- Landfill gas
- Gasoline
- Diesel
- Kerosene
- LPG
- Coke
- Others

Proposed Emission Factors
(General Reporting Only)

- CO2 emission factors will be provided for each fuel type in ARB guidance
  - Example: 53.05 kg CO2/MMBtu for natural gas
- Use default factors for general combustion sources not included in detailed ARB sector methods
- Users of fuels with highly variable carbon content may be required to test for heating value on a regular basis

Example CCAR Emission Factors

Fuel	Kg CO2/MMBtu
Bituminous Coal	93.50
Natural Gas	53.05
Distillate Oil/Diesel	73.14
Gasoline	70.91
Dry Wood	90.94
Landfill gas	52.07

Source: CCAR

Emission Factors
(Sector-Specific Reporting)

- More stringent methods for Cement Plants, Refineries, Cogeneration, Self-Generation, and Power Facilities
- Some Fuels (Coal, PET Coke, Refinery Gas, etc.)
  - Emission Factors based on Measured Carbon and Heat Content
- Other Fuels (Natural Gas, etc.)
  - Emission Factors based on Measured Heat Content
- Possibly similar requirements for facilities that later enter cap-and-trade system

Reporting Indirect Energy Use (if required)

- Electricity usage from utility bills
- Methodology
  - Facility operator provides annual electricity usage and power provider
  - ARB to apply electricity emission factor specific to power provider
  - Total annual emissions = emission factor * annual electricity usage
- Imported steam, heating, cooling
  - Source and amount of BTUs purchased

Comments and Feedback?

Cogeneration

Proposed Approach

Cogeneration Facilities: Mandatory Reporting

- Grid Connected Cogeneration and Stand-Alone/ Self-Generation Facilities ≥ 1 MW
- Cogeneration and Self-Generation Facilities Part of Sectors Mandated for Reporting
  - Refineries
  - Power/Utilities
  - Cement Plants
  - GRP ≥25,000 tons
- Responsible Reporting Party
  - Management/Operational Control
- Reporting Requirements

Cogeneration: Reporting Requirements

- Type of Facility
- Fuel Type and Amount Consumed
- CHP Technology Type(s)
- Total CO_2, CH_4, N_2O
- Total electricity (MWh) output, sold to the grid, sold or provided to other users, and consumed on-site
- Total thermal energy (BTUs) output, usable thermal energy, and BTUs consumed on-site
- Indirect electricity purchases
- Allocated emissions based on energy stream output

Cogeneration: GHG Emissions Allocation

- Stationary Combustion Emissions On-Site Reported as Direct Emissions
- Methods Evaluated
  - Work Potential
  - Energy Content
  - Public Utilities Commission (PUC) Conversion
  - Efficiency
- Considering Two Approaches
  - PUC Conversion Method
  - California Climate Action Registry (Registry) Efficiency Method

PUC Conversion Method: GHG Emissions Allocation

$$\text{Emission Rate} = \frac{\text{Total GHG Emissions}}{\text{Electricity Output (kWh)} + \text{Usable Thermal Energy (kWh)}}$$

Where:

Total GHG Emissions = Metric Tons CO_2e

Electricity Output = Total Produced Annually

Thermal Energy Output = Usable Thermal Energy*

Allocated Emissions:

$\text{Emissions}_{\text{Electricity}}$ = Emission Rate • Electricity Output

$\text{Emissions}_{\text{Thermal Energy}}$ = Total GHG Emissions – $\text{Emissions}_{\text{Electricity}}$

*FERC Definition: Thermal Energy Delivered to a Thermal Host

PUC Conversion Method: Example Calculation

$$\text{Emission Rate} = \frac{\text{Total GHG Emissions}}{\text{Electricity Output (kWh)} + \text{Usable Thermal Energy (kWh)}}$$

Where:

Total GHG Emissions	= 435,982 Metric Tons CO_2e
Electricity Output	= 1,100,600 MWh
Usable Thermal Energy	= 2,710,000 million BTU
Emission Rate	= 0.00023 Metric Tons CO_2e/kWh

Allocated Emissions:

Energy Stream	Metric Tons CO_2e
Electricity	253,138
Thermal Energy	182,844
Total	435,982

Note: Example calculation uses API Compendium Assumptions & Input Data

Registry Efficiency Method: GHG Emissions Allocation

Thermal Energy	Electricity
$E_H = \frac{H/e_H}{H/e_H + P/e_P} \times E_T$	$E_P = E_T - E_H$

Where:

E_H = Emissions allocated to steam production

H = Total steam (or heat) output (MMBtu)

e_H = Efficiency of steam (or heat) production

P = Total electricity output (MMBtu)

e_P = Efficiency of electricity generation

E_T = Total direct emissions of the CHP System

E_P = Emissions allocated to electricity production

Registry Efficiency Method: Example Calculation

$$E_H = \frac{\frac{3.614\times10^{12}\ \text{BTU}}{0.80}}{\frac{3.614\times10^{12}\ \text{BTU}}{0.80} + \frac{3.755\times10^{12}\ \text{BTU}}{0.35}} \times 435{,}982 \text{metric tons } CO_2e$$

Where:

E_H = Emissions allocated to steam production

H = 3.614×10^{12} BTU

e_H = 80% (Efficiency of steam production)

P = 3.755×10^{12} BTU

e_P = 35% (Efficiency of electricity generation)

E_T = 435,982 metric tons CO_2e

E_P = Emissions allocated to electricity production

EH = 129,186 metric tons CO_2e

EP = 435,982 – 129,186 = **306,982 metric tons CO_2e**

Comparison of Methods: GHG Emissions Allocation

Energy Stream	PUC Conversion Method (Metric Tons CO_2e)	Registry Efficiency Method (Metric Tons CO_2e)
Electricity	253,138	306,796
Thermal Energy	182,844	129,186

Cogeneration: Key Questions

- Should ARB adopt the PUC Conversion Method or the Registry's Efficiency Method?
- Do cogeneration facilities collect data on actual thermal energy and electricity production efficiency values?
- Are there any recommendations for ARB to adopt another method to allocate GHG emissions?
- Other comments?

Verification:

Initial Proposal

Why Verification?

- AB 32 requires it
- Expected under international standards
- Experience with voluntary reporting shows the need
- Complexity of emissions estimation
- Critical for credibility of program

Verification: Initial Proposal

- Require annual third-party verification for refineries, utilities, power plants and co-generation facilities selling power to the grid or other users
- Require triennial third-party verification for cement plants and other stationary combustion sources ≥ 25,000 tons CO_2
- Require annual third-party verification for anyone entering a future market

Third Party Verification

- Consistent with existing standards, including ISO
  - Already required for CCAR members
- Verifiers to be trained under ARB approved curriculum
  - Demonstrated expertise
  - Consistency in verification

Regulation to Specify

- Core GHG data verification requirements
- Accreditation requirements for verifiers
- Conflict-of-interest limitations
- ARB oversight

Verification Activities

- Identify sources and review data management systems
- Focus on most significant and uncertain sources
- Differences exceeding 5 percent considered significant
- Detailed verification report to facility and ARB

Accreditation

- ARB to specify requirements necessary to become verifier
- Propose following fairly stringent international and CCAR approaches

Conflict of Interest

- Term Limit
  - Verifiers to be changed after 3 years of conducting verification activities
  - Allowed to resume with client after 1 year off cycle for verification
- Conflict of Interest Policy
  - Must agree not to act on behalf of reporting facility as both consultant and verifier concurrently or within any 3 year period

Verification Oversight

- ARB staff responsible for enforcing regulation
- Verification process will assist efforts to enforce compliance
- Targeted review of submitted data and verifiers

Comments and Ideas?

- Comments by phone, email, writing are also encouraged
- Comments by July 6th would be most helpful
- There will be additional opportunities for feedback

Next Steps and Schedule

- Continue stakeholder discussions
- Draft regulatory text available late-July
- Next full workshop August 9
- Staff Report & Proposed Regulation in October
- Board Hearing in December

ARB Contacts

Richard Bode – Chief
Emissions Inventory Branch
rbode@arb.ca.gov
(916) 323-8413

Doug Thompson – Manager
Climate Change Reporting Section
dthompson@arb.ca.gov
(916) 322-7062

Webster Tasat – Manager
Emission Inventory Analysis Section
wtasat@arb.ca.gov
(916) 323-4950

Robert Jenne – Legal Counsel
rjenne@arb.ca.gov
(916) 322-3762

GHG Mandatory Reporting Website
http://www.arb.ca.gov/cc/ccei/ccei.htm

Staff Contacts

Reporting Regulation, Patrick Gaffney
pgaffney@arb.ca.gov (916) 322-7303

General Reporting Protocol, Rajinder Sahota
rsahota@arb.ca.gov (916) 323-8503

Verification, Rajinder Sahota
rsahota@arb.ca.gov (916) 323-8503

Power/Utilities, Pamela Burmich
pburmich@arb.ca.gov (916) 323-8475

Cement, Cogeneration, Dana Papke
dpapke@arb.ca.gov (916) 323-2308

Forestry, Jeanne Panek
jpanek@arb.ca.gov (916) 322-1029

Oil and Gas, Byard Mosher
bmosher@arb.ca.gov (916) 323-1185